

3ROLVK VFLHQFH DQG WKH KLJKHU JHQGHU VWLOO PDWWHU"

-XVW\QD PRLQDLDN 0DDRGUHDNUWD GX 9DOO

3HGDJRJLFDQ 8QLYHUVLW\ RI &UDFRZ 3RGFKRU * \FK &UDFR
\$QGUJHM)U\FJ ORGUJHZVNL &UDFRZ 8QLYHUVLW\ +HUOLQJD *

\$EVWUDRW DUWLFOH SUHVHQWV VWHUHRW\SHV DQG I
ZRPHQ ZKR KDYH FRPSLOHG WR FRQWHPSRUDU\ WU
FRQGLWLRQV RI WKHLU SUHVHQFH LQ VRFLDO DQG HF
RXW D GLDJQRVLV RI WKH FXUUHQW VLWXDWLRQ LQ
REVWDFOHV DQG RSSRUWXQLWLHV WKDW KDYH HPHUJ
D VFLHQWLILF FDUHHU ZLWK SDUWLFXODU UHIHUHQFH
RI WKH PDLQ SXUSRVHV RI WKLV SDSHU LV WR SURSR
FRQGXFWHG E\ YDULRXV LQVWLWXWLRQV LQ YDULRXV

.H\ZRUGWJHQGHU KLJKHU HGXFDWLRQ VFLHQFH ZRPHQ

,QWURGXFWLRQ

3ROLVK IHPDOHV LQ VFLHQFH VKDOO IDFH D WULSOH JO
WKHLU SDUWQHUV ZKLOH WKH SURPRWHG PRGHO SUH
WUDGLWLRQDO UROH ZRPDQ SOD\ DW KRPH ZRXOG F
ZRPHQ LQ 3ROLVK VFLHQFH LV FRQFHUQHG 7KLV LV KR
DQG FHUWDLQ PDOH UHVHDFKHUV RI WKH SUREOHP S
H[SHULHQFH :KDW UHPDLQV WUXH LV WKH IDFW WKDW
FUHDWH WKHLU LGHQWLW\ DURXQG WKH D[LQV LQFOXGL
SDUW ± PRWKHUKRRG 1HYHUWKHOHV LV LV SRVVLEO
RI SHUFHLYLQJ WKH VRFLDO UROH SOD\HG E\ ZRPDQ ,W
SDUWLFXODU KLJKHU HGXFDWLRQ 1RZDGD\ WKHUH L
SHUFHQWDJH RI EXVLQHVV ZRPHQ DQG ZRPHQ VFLHQWL
DV ZHOO DV IDLWK LQ JDLQLQJ VXFFHVV ZLWKLQ WKLV
ZRPDQ > @

+RZHYHU QRW DOO SHRSOH UHFRJQLJH WKH KLJK G
V\WHP DV D SRVLWLYH DVSHFW \$OWKRXJK WKH SHU
GLGDFWLF ZRUNHUV LQ 3ROLVK KLJKHU HGXFDWLRQ LQ

© &RUUHVSRQGLQJ DXWKRU MZRMQLDN#XS NUDNRZ SO

(XURSHDQ 8QLRQ DQG HYHQ KLJKHU \HW WKLW SKHQ
SURRI RI LQFUHDVLRQ\ HTXDO WUHDWPHQW EHWZHHQ
DV D UHVXOW RI FUHDWLQJ D VSHFLILF VSDFH ZKLFK
HPSOR\HHV HVSHFLDOO\ PHQ PRYH WR WKH HFRQRPL
FRQGLWLRQV DVVRFLDWHG ZLWK HPSOR\PHQW DQG UH
VSHFLILF IRU (DVWHUQ DQG &HQWUDO (XURSH LQFOXGI
WKH (XURSHDQ &RPPLVVLRQ ZKLFK FOHDUO\ ZDUQV W
VKRXOG QRW EH VHHQ DV D UHDVRQ IRU VDWLVIDFWLRQ
VFLHQFH VHFWRU LV HYLGHQWO\ XQGHUQGHG 7KH U
UHVHDFK DQG GHYHORSPHQW VHFWRU LQ FRXQWULHV
&RPPLVVLRQ 7KH ELJJHVW GLIIHUHQFH UHJDUGLQ
JHQGHU JDS LV QRWHG LQ -DSDQ +D\HV ZKHUH ZR
VFLHQWLVWV > @

,W LV DOVR LPSRUWDQW WR EHDU LQ PLQG WKDW GH
WKH HGXFDWLRQDO \V\WHP LQ 3RODQG TXLWH GLVWXU
ZRPHQ FRQVWLWXWH RQO\ D IUDFWLRQ RI ERGLHV JRY
LQVWLWXWLRQV RSHUDWLQJ ZLWKLQ WKH VFRSH RI WKH
OHDYH WKH DFDGHPLF \V\WHP DIWHU REWDLQLQJ 3K' W
FDUHHU LQ VFLHQFH LV SDUDOOHO WR WKH GHYHORSPH
\$JQLHVJND -DQLDN -DVL VND LQGLFDWHV WKDW WKH D
DVVXPHG E\ ZRPHQ LQ D KLVWRULFDOO\ VKRUW WLP
UHVHDFKHU KDV WR ZHDU DQ XQLRUP PDGH IRU D PD
DSSURDFK OHDGV WR WKHLU PDUJLQDOLJDFWLRQ > @
IUXVWUDWLRQ GHFODUH E\ 3ROLVK ZRPHQ VFLHQWLVV
IRUZDUG ZKLOH WKH VXUURXQGLQJ ZRUOG UHPDLQV XQ
7KH LVVXH PHQWLRQHG DERYH FOHDUO\ VKRZV WKD
JHQGHU TXHVWLRQV PXVW LQYROYH DVVHUWLYH TXHV
DWWHQWLRQ WR WKH SRZHU RI GRPLQDQW YDOXHV D
DVNHG DQG KRZ UHVHDFK LV XVHG 7KHUH LV D QHHG
FRPELQH HGXFDWLRQDO GDWD DQG DSSURDFK EHWZHHN
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,Q 3RODQG ZRPHQ KDYH EHHQ DOORZHG WR XQLYHUVLV
LV SHUFHLYHG DV WKH EHJLQQLQJ RI WKH FKDQJH
SHUPLVVLRQ WR SDUWLFLSDWH LQ OHFWXUHV IURP WKH
\HDU ZDV WKH \HDU ZKHQ WKH ILUVW ZRPDQ L
8QLYHUVLV\ VDW D GRFWRUDO H[DPLQDWRQ 3ROLVK
XQLYHUVLVWLVH PFK HDUOLHU WKDQ WKH HQWLWOHPH
ZRPHQ GHVLULQJ WR VWXG\ IUHTXHQWO\ PRYHG DEUR
JHQHUDO KRZ PDQ\ 3ROLVK ZRPHQ VWXGLHG DEURDG G
WKH SDUWLWLRQV RI 3RODQG WKH\ ZHUH UHJLVWHUHG
DQG 3UXVLD > @ \$IWHU D WULDO SHULRG ODVWLQJ
D GRJHQ IHPDOH VWXGHQWV VWXG\LQJ LQ &UDFRZ LQ
HQWHUHG OHFWXUH URRPV DW WKH -DJLHOORQLDQ 8QL
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DOORZLQJ WKHP WR HQWHU D GLGDFWLF WHDP IDFHG
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PRUH GLILFXOW VWHS WR WDNH IRU ZRPHQ)ROORZLQ
RI HGXFDWLRQ LQ WKH \HDU DOO GHSDUWPHQWV D
RSLQLRQV UHJDUGLQJ WKLW LVVXH %RGLHV DW WZR ID
ODZ VWURQJO\ RSSRVHG IHPDOH KDELOLDWLRQ UHS
WKHLU QHJDWLYH RSLQLRQ DW WKLW VXEWHFV DV WK
IDLUO\ SUHPDWXUH 7KH VWDWPHQW GHFODUH E\ WK
8QLYHUVLW\ GLIIHUG QRWLFHDEO\ IURP WKH DERYH
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GHJUHH RU WLWOH ZH WDNH LQWR DFRXQW WKH EL
ZRPHQ DQG PHQ FDQ EH REVHUYHG LQ SDUWLFXODU VFI
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SHUFHQW RI VFLHQWLVWV LQ 3RODQG > @ 7KLV SUR
WKH (XURSHDQ 8QLRQ ZKHUH LW HTXDOV > @ &RP
VWDWHV RI WKH (XURSHDQ 8QLRQ IRU WKH \HDU LC
SHRSOH HPSOR\HG LQ VFLHQFH DQG WKH RYHUDOO HP
ZRPHQ KLUHG LQ VFLHQFH UHODWHG SURIHVVLRQV PDN
DPRQJ PHQ WKLW YDOXH UHDFKHV RQO\ :KDW FRQFI
ZRPHQ FRQVWLWXWH DERXW KDOI RI WKHP LQ WKH (XU
EXW WKH KDELOLDWLRQ GRFWRUDO GHJUHH ZDV JUD
DYDLODEOH IRU RI ZRPHQ > @
,Q 3RODQG ZRPHQ KROGLQJ WKH SRVLWLRQ RI D UHFV
WKH \HDU WKHUH ZHUH IHPDOH UHFWRUV DQG LQ
JRYHUQLQJ ERGLHV DW XQLYHUVLWLHV DUH FRQFHUQH
RI ZRPHQ ZHUH HPSOR\HG DV SUR UHFWRUV D
SRVLWLRQ RI D GHDQ ZDV HQWUXVWHG WR RI ZRP
IHPDOH GHDQV 7KH VDPH WHQGHHQFLHV FRXOG EH REV

GHDQ LQ WKH \HDU ZRPHQ KHOG WKLV SRVLWL
 \HDU ZLWK D VOLJKW GHFOLQH WR > @
 7KLV LV DOVR WKH FDVH RI GHFLVLYH ERGLHV LQ 3RO
 JURXS LV FORVH WR ,Q WKH 3ROLVK \$FFUHGLWDWLR
 PHPEHUV RI WKH &RPPLWWHH 7KH 3UHVVLGLXP RI WK
 'HJUHHV DQG 7LWOHV KDV QR IHPDOH PHPEHUV DW DO
 (GXFDWLRQ PDQDJHULDO IXQFWLRQV DUH RFFXSLHG VR
 DPRQJ DOO PHPEHUV RI WKH SUHVVLGLXP JRYHUQLQJ
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 FKDUDFWHULVWLF LV WKH IDFW WKDW WKH LQVWLWXW
 UHVHDFK QDPHO\ WKH 1DWLRQDO 6FLHQFH &HQWH
 ZKR LV WKH GHSXW\ GLUHFWRU RI WKLV LQVWLWXWLF
 LQVWLWXWLRQ LV QRW IDU IURP WKH FKDUDFWHUL]HG
 RQO\ ZRPHQ 6OLJKWO\ PRUH OHYHOOHG SURSUWLR
 &RRUGLQDWURV ZKHUH ZH KDYH ZRPHQ LQ HDFK RI W
 8QLW RI ([DFW DQG 7HFKQLFDO 6FLHQFHV DPRQJ PHP
 WKH PHPEHU SUHVVLGLXP RI WKH 3ROLVK \$FDGHP\ RI
 IHPDOH PHPEHU VWDWLWVLFV IRU
 6XPPLQJ XS WKLV SDUW RI WKH DUWLFOH LW LV ZR
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 HYHQ WKRXJK WKH SHUFHQWDJH RI IHPDOH VFLHQWLWV
 DPRXQW RI ZRPHQ LQ DFDGHPLF DQG UHVHDFK SRVLWL

'LIILFXOWLHV DQG REVWDFOHV

2EVWDFOHV ZKLFK ZH FDQ REVHUYH ZKHQ DQDO\VLQJ
 3ROLVK ZRPHQ VFLHQWLWV PD\ EH JHQHUDOO\ GLYLGL
 LQVWLWXWLRQDO :ULWLQJ DERXW WKH LQLWLDO WIS
 HODERUDWHG E\ %RJVáDZD %XGURZVND > @ ZH FDC
 EDUULHUV DQG WKHVH DUH LQWHUQDO EDUULHUV D
 HQWDQJOHPPHQW LQ WUDGLWLRQDO UROHV
 7KH ILUVW RQHV UHVXOW PDLQO\ IURP LQGLYLGXDO E
 LQ UHODWLRQ ZLWK WKHLU SDUWLFLSDWLRQ LQ SURIH
 VNLOOV FRPHV ILUVW > @ 8QIRUWXQDWHO\ WKLV IH
 IUHTXHQWO\ FDXVHV SHFXOLDU ZLWKGUDZDO QH[W WR
 2Q WKH RWKHU KDQG IURP DQ REMHFVLYH SRLQW RI
 VRUW RI VFHSWLFVLP KHOSV WKHP SHUIRUP DOO WKHL
 OHYHO RI SUHSDUDWLRQ DQG SURIHVVLRQDOLVP 7KH \
 LQ VRFLDOO\ LPSRVHG WUDGLWLRQDO UROHV \$ PRGHU
 LV VXSSRVHG WR EH D ORYHO\ ZLIH ZRQGHUOXO PRWK
 KRXXVH ZLIH H[FHOHQW HPSOR\HU HWF \$UH WKHVH V
 ZRPDQ" :H DUH SHUIHFWO\ DZDUH RI WKH IDFW WKDW S
 JRRG LQ RQH RU PD\EH WZR GRPDLQV \$Q\WKLQJ PRUH
 RQH WKLQJ DW WKH FRVW RI VRPHWKLQJ HOVH > @
 ,Q WKH LQWURGXFWRQ WR WKLV DUWLFOH ZH KDYH
 3ROLVK ZRPHQ FUHDWH WKHLU LGHQWLW\ DUH VWLO
 REOLJDWLRQV DQG HVSHFLDOO\ PRWKHUKRRG \$QG PD
 IDFW VR PDQ\ ZRPHQ OHDYH VFLHQFH > @ \$ PXOWL
 SURIHVVLRQDO SUHSDUDWLRQ DQG SDVVLRQ IRU VFLH
 WZRIROG SUHVXUH RQ RQH KDQG WKH VRFLDO SUHV
 WKH RWKHU KDQG WKH HQYLURQPHQWDO SUHVXUH UH

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SURIHVLRQDO GHYHORSFHQW EHFDXVH RI IDPLO\ REOL
:LWKLQ WKLV VFRSH WKH HQYLURQPHQW RI 3ROLVK
IXOO IOH[LELOLW\ ZKHQ WDNLQJ DGYDQWDJH RI SDUHG
LQIOXHQFH RQ WKH HIILFLHQF\ FRQQHFWHG ZLWK SOD
HQJJDJHPHQW RI ERWK SDUHQWV ODWHUQLW\ OHDYH ³U
DQG DGPLQLVWUDWLYH REOLJDWLRQV SHUIRUPHG IRU
UHVXOW LQ QHJOLJHQFH RI DFDGHPLF GHYHORSFHQW
3ROLVK \VWHP D IHPDOH VFLHQWLWV LV GHSULYHG E
REWDLQLQJ ILQDQLDO VXSSRUW IRU H[DPSOH IRU KH
RU SXEOLVKLQJ IHHV 7KHUH DUH QR \VWHPLF VROX
SDUHQWV PDLQ\ PRWKHUV IHPDOH VFLHQWLWV IRU
VXSSRUW IRU DFDGHPLF GHYHORSFHQW \$QRWKHU SUP
JUDQW SURJUDPPHV RIIHUG LQ 3RODQG ZLWK OLWW
SURORQJ WKHP RU VXVSHQG WKHP IRU D FHUWDLQ SHUI
7KH LVVXH DVVRFLDWHG ZLWK IHPDOH DQG PDOH G
DQRWKHU TXLWH FRPSOLFDFWHG PDWWHU ORVW RI WKH
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SD\PHQW RI SURYLVLQJ IRU PDOH DQG IHPDOH GRFW
PDNLQJ WKHP DOPRVW LPSRVVLEOH WR SODQ KRXXVK
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VLPXOWDQHRXVO\ ZLWK QR SRVVLELOLW\ WR WDNH DG
NLQGHUJDUWHQ VHUylfHV SODFHV \RXQJ SDUHQWV LG
+HUH WR ILQLVK GLYDJDWLRQV RQ EDUULHUV UHVX
HPSKDVljLQJ WKDW VWDWLWVLFDOO\ D WUXO\ FRPSOHW
WKHLU IRUWLHWK \HDU RI OLIH &KLOGUHQ DUH DOUHD
DOO 7KDW LV ZK\ ZH QHHG WR HPSKDVljH RQFH PRUH
SURORQJ WKH WLPH HVVHQWLDQ WR FRQFOXGH GRFWR
HTXDOO\ LPSRUWDQW IRU ZRPHQ WR XUJH FKLOGUHQ\ V
WRGD\ 3ROLVK ODZ HQDEOHV WKH XVH RI SDWHUQDO O
OHDVW XQWLO QRZ WDNH DGYDQWDJH RI WKLV RSSRU
WKHLU UHWXUQ WR ZRUN DIWHU PDWHUQLW\ OHDYH Z
ERWK GLGDFWLF DQG DGPLQLVWUDWLYH ZRUN DQG D
SRVVLELOLW\ WR ZRUN DW KRPH
7KH VHFRQG W\SH RI EDUULHUV 3ROLVK IHPDOH VFLH
WKH JURXS RI LQVWLWXWLRQDO LPSHGLPHQWV ZKLFK
GLVFULPLQDWLQJ DWLWXGHV 7KLV LV H[SOLFLWO\ YL
WKLV DUWLFOH 'LVFUHSDQFLHV DUH DOVR UHIOHFWHG
8QLRQ IHPDOH VFLHQWLWV HDUQH RQ DYHUDJH EHW
LQ WKH SXEOLF VHFWRU LQ \$OWKRXXJK WKH DYHUD
WKH GLVSDULW\ LV SDUWLFXODUO\ ODUJH LQ SK\VLV
WKDQ PHQ
\$ ZRPDQ KDV WR EH PFK EHWWHU WKDQ D PDQ LQ RU
SURIHVLRQDO SRVLWLRQ \$ JODVV FHLQLQJ LV WKH Q
DPELWLRXV HGXFDFWHG ZRPHQ DUH IRUFHG WR IDFH
WKLV SKHQRPHQW 7KHVH EDUULHUV DUH QRW FDXV
GHFUHHV ,QGHHG WKHLU RULJLQV OLH LQ FXOWXUDO
LQ WKH PHQWDO\ RI ERWK PHQ DQG ZRPHQ 3HUYDVL
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 GHDQV RU GHSXWLHV GHDOLQJ ZLWK DOO NLQGV RI
 PDQDJHPHQW RI WKH HQWLW\ \$FFRUGLQJ WR ,]DEHOD :
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 WKDW WKHUH LV QR GLVFULPLQDWLRQ LQ KLV LQVWLW
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 SURPRWLRQ GLILFXOW RU DW OHDVW GRHV QRW PDNH
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 LV QRW DWWULEXWHG VROHO\ WR FRXQWULHV VXFK D
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 KLJKHU OHYHO RI GHYHORSPHQW :KDW VHHPV LQWHU
 XQGHUWDNHQ LQLWLDWLYHV FRQFHQWUDWH RQ WKH IL
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 VWXGLHV LQ WKH ILHOG RI SXUH VFLHQFHV WHFKRRO
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 VFLHQWLILF FDUULHU +RULJHQ 3URJUDPPH
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 XQLYHUVLWLHV´ DQG 3*LUOV WR SXUH VFLHQFHV´ > @
)XUWKHUPRUH LW LV DOVR ZRUWK PHQWLRQLQJ WKH
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 'DWD FROOHFWHG E\ : ,6\$7 DV D UHVXOW RI FRRSHUDV
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 : ,6\$7 LQ FRRSHUDWLRQ ZLWK WKH 2UJDQLJDWLRQ IRU
 :RUOG 2:6' DQG WKDQNV WR ILQDQFLDO VXSSRUV
 DEOH WR PDS WKH SRVVLELOLWLHV DQG REVWDFOHV WH
 .RUHD 56\$ (8 DQG 86\$ KDYH WR IDFH
 ,Q UHODWLRQ WR WKH REWDLQHG UHVHDFK UHVXO
 DFWLRQV ZLWKLQ WKH VFRSH RI WKH 6HYHQWK 5HVHD
 EDVLF REMHFWLYH RI WKLV SURJUDPPH OLHV LQ HQFR
 VFLHQWLILF UHVHDFK DQG LQRYDWLYH DFWLYLW\ 2Q
 RIIHUV ILQDQFLDO KHOS WR UHVHDFK RUJDQLVDWLRQ
 DFWLYLW\ IRU WKH HTXDOLW\ EHWZHHQ ZRPHQ DQG P
)XQGV RIIHUG E\ WKH SURJUDPPH DUH DOVR XVHG WI
 VKRXOG GUDZ WKH DWWHQWLRQ RI WKLV JURXS WR J
 OHYHOOLQJ VROXWLRQV LQ UHVHDFK SURMHFWV &25'
 (8 IXQGV ZKLFK 3ROLVK ZRPHQ FDQ DOVR SDUWLFLSD
 DLPLQJ WR HQFRXUDJH ZRPHQ WR XQGHUWDNH ZRUN LG
 VXSSRUWLQJ WKH EDODQFH EHWZHHQ D SURIHVVLRQD
 UHFLSLHQWV RI ODULH 6NáRGRZVND &XULH SURJUDPPH
 5HVHDFK)UDPHZRUN 3URJUDPPH 35 DUH ZRPHQ
 'DWD FROOHFWHG GXULQJ UHVHDFK HQDEOH XV WH
 UDWLRQDO VFKHPH RI DFWLRQ 7KH\ VKRZ WKDW WKH H
 WHFKQRORJ\ DQG LQRYDWLRQV 67, LV GLUHFWO\ FRU
 7KH PDLQ VFRSH RI WKHVH HOHPHQWV ZKLFK PD\ EH F
 LQIOXHQFH RQ WKH HTXDOLW\ RI IHPDOH FKDQFHV LQ V

KLJKHU HFRQRPLF VWDWXV ZLGHU SDUWLFLSDWLRQ
HFRQRPLF WHFKQRORJLFDO DQG SURGXFWLYH UHVRXU
ILQDQFLDO UHVRXUFHV 7KH DERYH PHQWLRQHG ILQGL
WKDW ZRPHQ H[SHULHQFH JUHDWHU HTXDOLW\ LQ FRX
VXSSRUW SDUHQWV E\ JXDUDQWHHLQJ FDUH IRU FKLOG
IRU ZRPHQ DQG PHQ 1XPEHU RI VWXGLHV DOVR UHYH
DFFXPXODWH FRKHUHQW DQG UHOLDEOH VWDWLVWLFD
DUHDV ZKLFK DV D UHVXOW OHDGV WR LQKLELWLQJ WK
VWUDWHJLHV DQG SURJUDPPHV 81&7\$' &XUUHQW 6W
,QQRWDWLRQ
\$V IDU DV 3ROLVK SURJUDPPHV DQG LQLWLDWLYHV DU
RQH V WGDW DUH TXLWH GLVWLQJXLVKDEOH :H FDQ SDU
HODERUDWHG E\ WKH)RXQGDLRQ IRU 3ROLVK 6FLHQF
IHPDOH VFLHQWLWV \$IWHU VHYHUDO HGLWLRQV WKH
SURLGHV VXSSRUW IRU PHQ ZKR GHFLGHG WR WDNH :
FKLOGUHQ 320267 \$QRWKHU SRSXODU SURJUDPPH
LQ WKH HQYLURQPHQW RI \RXQJ VFLHQWLWV LV WK
DGGUHVHVG WR GRFWRUDO VWXGHQWV GHYHORSLQ
VFLHQFHV 8QWLO QRZ ZH DOUHDG\ KDG WKLUWHHQ HG
YDOXH RI JUDQWV LV KLJKHU HYHU\ HDU > @
\$OO H[DPSOHV RI ZKLFK PHQWLRQ KDV EHHQ PDGH D
DOWKRXJK WKLW GHVFULSWLRQ OHDGV WR WKH FRQF
SURJUDPPHV DGGUHVHVG DW \RXQJ DFDGHPLFV GHYHO
VFLHQFH)LQDQFLDO VXSSRUW LV REYLRXVO\ D FUXFL
VKRXOG UHYHDO D PRUH V\VWHPLF FKDUDFWHU 7KDW L
DVVXPH VXEVDQWLDQ VXSSRUW DQG WKHVH DUH QRW
)URP WKLW SDUWLFXODU SHUVSHFWLYH DQ LQLWLDW
WKDW IRFXVHV GLUHFWO\ RQ IHPDOH VFLHQWLWV DQ
SURMHFW LV HQWLWOHG (QFRXUDJHPHQW WR \$GYDQFH
LQLWLDWLYHV HVWDEOLVKHG ZLWKLQ WKH VFRSH RI W
DQG 7HFKQRORJLFDO 'HYHORSPHQW 7KH IXQGDPHQWDO
GHVLJQHG HVSHFLDOO\ IRU IHPDOH VFLHQWLWV ZKR
LQ VHOHFWHG (8 VWDWHV 8QIRUWXQDWHO\ LW LV XVH
DQG WKLW RQO\ SURYHV WKH K\SRWKHVLV WKDW DW WK
DUH LJQRUHG DQG JRQH ZLWKRXX DQ\ UHVSQVH
,QWHUQDWLRQDO FROOHFWLYH RI WUDLQHUV FRQG)
VSHFLILFLW\ RI WKH UHTXLUHPHQWV SRVHG LQ IURQW
LV LQWHUHVWLQJ GXULQJ WKH FRXUVH RI WKH SURMHF
PRUH GHWHUPLQHG E\ FXOWXUDO IDFWRUV WKDQ E\ W
FRXQWU\ ,W LV HVVHQWLDQ WR PHQWLRQ WKDW DV D U
LW ZDV VKRZQ WKDW PRUH WKDQ SHUFHQW RI SDUWL
WR WKHLU IHPDOH IULHQGV IDFLQJ D VLPLODU VLWXDW
\$SDUW IURP WKH DERYH PHQWLRQHG DQRWKHU LG
PHQWLRQLQJ ZLWKLQ WKH VFRSH RI WKH GLVFXVHVG V
6FLHQWLWV 7KLV LV DQ LQWHUQDWLRQDO QRQ SURIL
LQWHUHVW DQG DVSLUDWLRQV RI PRUH WKDQ (XU
GRHV QRW OLPLW LWV DFWLRQV WR WKH (XURSHDQ JRQ
WKH FRQLQHQW)URP WKH GDWH ZKHQ LW ZDV HVWDI
KDV DILOLDWHG ZLWK PRUH WKDQ QHWZRUV RI IH
ZLWK SURPRWLQJ ZRPHQ LQ WKH DFDGHPLF VHFWRU 7K
LQ SURPRWLQJ HTXDO FKDQFHV LQ YDULRXV DFDGHPLF

FUHDWLQJ WKH SRVVLELOLW\ IRU EHWWHU DXGLELOL
DVVRFLDWHG ZLWK WKH FUHDWLRQ RI (XURSHDQ UHVHD
\$V IDU DV 3RODQG LV FRQFHUQHG VLPLODU DLPV DU
1HWZRUN HVWDEOLVKHG LQ > @ 7KH DFWLRQV
3ROLVK IHPDOH UHVHDUFKHUV DQG VXSSRUWLQJ IHPDO
7KH RUJDQLJDWLRQ DWWHPSWV WR VROYH SUREOHPV
DQG UHVHDUFK ZRUN DPRQJ RWKHUV LW RIIHUV FR
LQWHOOFWXDO SURSHU\ SURWHFWLRQ DQG SDWHQV
LQWHUQDWLRQDO FRPSHWLWLRQV DQG H[KLELWLRQV
FRRSHUDWHV ZLWK VFLHQWLILF DQG IHPDOH RUJDQLJD
E\ SDUWLFLSDWLRQ LQ PHHWLQJV ZLWK JRYHUQPHQWDO

&RQFOXVLRQ

<HDUV RI UHVHDUFK KDYH UHYHDOHG WKDW VH[DQG JH
FUXFLDOO\ LPSRUWDQW WR LGHQWLI\ JHQGHU ELDV DQ
WHFKQRORJ\ > @ ,W LV FOHDUO\ YLVLEOH WKDW WKH
VHFWRU LV QRW VDWLVI\LQJ 3ROLVK XQLYHUVLWLHV K
WKH\ DUH LQ RWKHU SDUWV RI WKH ZRUOG \$FDGHPL
H[DPSON DQG DGYDQFHQW DQG UHZDUGV GHSHQG LC
SURPRWLRQ <HW VWXG\ DIWHU VWXG\ VKRZV WKDW ZR
VR EXLOGLQJ FDUHHU SDWKV ZKLFK UHTXLUH WKLV NLG
36WUXFWXUDO FKDQJH\ LQ XQLYHUVLWLHV DQG UHVHD
JHQGHU DZDUH WKHUHE\ PRGHUQLVLQJ WKHLU RUJD
LPSOLFOWLRQV IRU HTXDO RSSRUWXQLWLHV WKH IXOC
DQG WKH TXDOLW\ RI VFLHQWLILF UHVHDUFK ,W LPSOL
UDWKHU WKDQ SLHFPHDO VKRUW WHUP PHDVXUHV > @
\$Q HOHPHQW HYRNQJ FRQFHUQ RI WKH DXWKRUV LV
VFKRODUVKLS SURJUDPPHV IRU \RXQJ ZRPHQ VWDUWLQJ
RXUVHOYHV ZK\ RXU QHLJKERXU FRXQWU\ WKH &JHF
WR SDUWLFLSDWH LQ D VHULHV RI LQLWLDWLYHV RI WK
ELJJHU DW OHDVW GXH WR GHPRJUDSKLF DGYDQWDJH
DFWLRQV 1XPHURXV GHEDWHV GHYRWHG LQ JHQHUDO
WKHLU FKDQFHV LQ YDULRXV DUHDV WKHUH LV QR UHV
H[DFWO\ WKLV VHFWRU VKRXOG EH WKH FUXFLDO IRU
HQXPHUDWHG DPRQJ WKH PRVW VWUDWHJLF RQH V\HW
RQH :H DUH IDFLQJ D GRXEOH XQGHUYDOXDWLRQ ILU
VFLHQFH DQG KLJKHU HGXFDWLRQ DQG VHFRQGO\ WK
VFLHQFH

8QGRXEWGOL WKH (8 SROLF\ LV D SRVLWLYH LPSX
3ROLVK VFLHQWLILF DQG UHVHDUFK VHFWRU 7KH 3ROL
FRODERUDWHV ZLWK D VSHFLDO XQLW RI WKH *HQHU
*HQGHU DQG (WKLFV DPRQJ RWKHUV ZLWKLQ WKH FRO
5HVHDUFK)UDPHZRUN 3URJUDPPH 6FLHQFH LQ WKH VF
*URXS RQ *HQGHU LQ 5HVHDUFK DQG ,QQRYDWLRQ 3U
FUXFLDO SULRULWLHV GHFODUH E\ WKH (XURSHDQ 5H
3ROLVK JRYHUQPHQW DQG LQVWLWXWLRQV UHVSRQVLE
REOLJHG WR XQGHUWDNH DFWLRQV DLPLQJ WR HOLPLQ
WKH SURIHVVLRQ DQG FDUHHU GHYHORSPHQW LQ WKH
HIILFLHQW XVH RI WKHLU FRPSHWLWLYH

6XPPLQJ XS LW LV HVVHQWLDO WR FOHDUO\ HPSKD
3ROLVK ZRPHQ JDLQ KLJKHU HGXFDWLRQ WKDQ 3ROLVK
RI WKHLU YDOXH DQG WKH\ EROGO\ UHDFK IRU SURIHV
GHOLEHUDWH VHOI SURPRWLRQ DQG FRQVWDQW LQYI
LQGLYLGXDO GHYHORSRPHQW FRQVWLWXWH WKH IRXQGI
SHUIHFWO\ DZDUH WKDW WKLV LV D KLJK VWDNHV JDF
VFLHQFH LV QRW RQO\ DQ LVVXH RI LQGLYLGXDO FDUHI
KDYLQJ GLUHFV DFFHVV WR NQRZOHGJH DQG LQIRUPDV
WKHVH JRRGV DW RQH\ V GLVSRVDO LQ WRGD\ V ZRUOG
DV DQ RSSRUWXQLW\ WR SDUWLFLSDWH LQ H[HUFLVLQJ

5HIHUHQFHV

%XGURZVND % 6]NODQ\ VXILW F]\OL FR EORNXMH M

&RUGLV 0DUQRZDQLH WDOHQWyZ VSUDZD SU\ZDWQ
NUDMDFK (QZLVH (QODUJH :RPHQ ,Q 6FLHQFH WR (DV
5HSRUW QR (85 3/ %UXVVHOV
&RUGLV :VSyOQRWRZ\ 6HUZLV ,QIRUPDF\MQ\ %DGD
KWS FRUGLV HXURSD HX IHWFK"&\$//(5 1(:6/,1.B3/B8

GX 9DOO 0 :VSyáF]HVQH 3RONL ± WUXGQR ü Z Z\E
.RELHW\ Z SROLW\FH ± NRELHW\ ZREHF SROLW\NL .UI

']LHZF]\Q\ QD SROLWHFKQLNL \$YDLODEOH DW KWW

(QFRXUDJHHPHQW WR \$GYDQFH 6XSSRUWLQJ :RPHQ
/LSLQVN\ \$ HG .]OQ &(:6
(XURSHDQ &RPPLVLRQ 6KH)LJXUHV 6WDWLVLWL
LQ 6FLHQFHV /X[HPERXUJ (XURSHDQ &RPPLVLRQ
(XURSHDQ &RPPLVLRQ 6KH)LJXUHV *HQGHU
6WDWLVLWLFV DQG ,QGLFDWRUV \$YDLODEOH DW
VRFLHW\ GRFXPHQWBOLEUDU\ SGIB VKHBILJXUHV
(XURSHDQ &RPPLVLRQ 6FLHQFH ,W\ V D JLWO WK
WKLQJ HX SO

(XURSHDQ &RPPLVLRQ 6SUDZR]GDQLH .(NREL
UHSUH]HQWRZDQH Z VHNWRU]H QDXNRZ\P 8(\$YDLOD
UHOHDVHB,3 BSO KWP

(XURSHDQ 3ODWIRUP RI :RPHQ 6FLHQWLVLV
KWS KRPH HSZV RUJ ILOWHU \$ERXW (XURSHDQ 3OD
)XQGDFMD QD 5]HF] 1DXNL 3ROVNLHM 3URJUDP
KWS ZZZ IQS RUJ SO RIHUWD SRPRVW JUDQW\ SRZ
)XV]DUD 0 .RELHW\ ZREHF XQLZHUV\WHFNLHM
ZZZ XQLJHQGHU RUJ "SDJH ELH]DF\ LVVXH DUWLFOH
*RGRZVND 0 6SRáHF]QR NXOWXURZH XZDUXQNRZD
3ROVFH 3D VWZR L 6SRáHF]H VWZR

*URYH - *ODVV FHLQLQJ UHPDLQV LQ SODFH IRU
KWS ZZZ WLPVKLJKHUHGXFDWLRQ FR XN IHDWXUH
LQGH[DUWLFOH

.DF]\ VND 0DFLHMRZVND 5 6]NODQ\ VXILW
KWS ZZZ FKDUDNWHU\HX DUW\NXO\ 3V\FKRORJLD

.LMDQND (6]NODQ\ VXILW OHSND SRGáRJD DNVDF
NRELHW\ QD U\QNX SUDF\ Z 3ROVFN \$YDLODEOH DW
/¶2UHDO 3ROVND 'OD .RELHW L 1DXNL
KWWS ZZZ ORUHDGODNRELHWLQDXNL SO LQGH[SK
0LQLVWU\ RI 6FLHQFH DQG +LJKHU (GXFDWLRQ \$YD
1DWLRQDO &HQWHU IRU 3URIHVVRQDO &HUWLILFDWLRQ
DQG UHWHQWLRQ \$YDLODEOH DW ZZZ FZOD RUJ
1RZDNRZVND (6]NODQ\ VXILW OHSND SRGáRJD
NRELHWRP FRP TXHHU DUW SKS"DUW
2E\ZDWHOH 1DXNL 1DXND MHVW NRELHW
KWWS RE\ZDWHOHQDXNL SO QDXND MHVW NRE
2UJDQLJDWLRQ IRU :RPHQ LQ 6FLHQFH IRU WKH 'HYH
KWWS RZVGZ LFWS LW DERXW RZVG
3DSDV 6 6FLHQFH *HQGHU *DS)LYH 5HDVRQV :RPH
DW KWWS ZZZ KXIIHQJWRQSRVW FRP VFI
ZRPHQ PHQBQB KWPO
3HUNRZVND 8 : ODWDFK SU]H] VDOH Z\NáDGF
SU]HZLQ áR VL SRQDG W\VL F\ VWXGHQ
KWWS IRUXPDNDG SO DUFKLZXP DUW\NXO\ NRE
3ROLVK :RPHQ 6FLHQWLVW 1HWZRUN \$YDLODEC
3URJUDP +RU\]RQW 6FLHQFH ,W¶V D JLU
KWWS SURJUDPKRU\]RQW EORJVSRW FRP VFI
6LHPLH VND 5 :RPHQ LQ DFDGHP\ LQ 3RODQG :LQ
(GXFDWLRQ LQ (XURSH
6LHPLH VND 5 .RELHW\ Z P VNLP]DZRG]LH QDXNRZ
HGV .RELHW\ GOD 3ROVNL 3ROVND GOD NRELHW
)XQGDFMD)HPLQRWHND
6XOLN 0 .RELHW\ Z QDXFH 3RGPLRWRZH L VSRáH
.DWRZLFH :\GDZQLFWZR 8QLZHUV\WHWX O VNLHJR
7ROOH 6 :HOFRPH WR QRUPDOLW\ &DUHHU VXSSR
HYDOXDWLRQ RI (QFRXUDJHPHQW WR \$GYDQFH 7UD
,Q /LSLQVN\ \$ HG (QFRXUDJHPHQW WR \$GYDQFH
6FLHQFH &DUHHUV .]OQ &(:6
81&7\$' &XUUHQW 6WXGLHV RQ 6FLHQFH 7HFKQRORJ\
OHQV WR VFLHQFH WHFKQRORJ\ DQG LQQRYDWLRQ
*HQHYD 1HZ <RUN
:L QLHZVNL 3 1LH]UyZQDQH .RELHW\ Z V\VVHPLH
\$GDP 0DUV]DáHN
:RPHQ LQ *OREDO 6FLHQFH DQG 7HFKQRORJ\ ±
KWWS ZZZ ZLVDW RUJ DERXW XV PLVVLRQ DFWLYLW